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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
ARCIERO, ADAM A	

ART UNIT	PAPER NUMBER
1795	

NOTIFICATION DATE	DELIVERY MODE
03/09/2010	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

DocketingDept@young-thompson.com

Office Action Summary	Application No.	Applicant(s)	
	10/519,548	GERRITSE ET AL.	
	Examiner	Art Unit	
	ADAM A. ARCIERO	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *November 04, 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-7 and 9-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *1,3-7 and 9-17* is/are allowed.

6)☒ Claim(s) *18-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application.
6) ☐ Other: _____.

BIOFUEL CELL

Examiner: Adam Arciero S.N. 10/519,548 Art Unit: 1795 March 1, 2010

DETAILED ACTION

1. The Applicant's amendment filed on November 04, 2009 was received. Claim 2 has been canceled. Claims 1, 3 and 20 are currently amended.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 103

3. The claim rejections under 35 U.S.C. 103(a) as being unpatentable over Kim et al. and Chao et al. on claims 1, 4-7 and 9-10 are withdrawn, because Applicant has amended independent claim 1.

4. The claim rejections under 35 U.S.C. 103(a) as being unpatentable over Kim et al. ('061) and Chao et al. on claims 1, 4-7, 9-10 and 17 are withdrawn, because Applicant has amended independent claim 1.

5. The claim rejections under 35 U.S.C. 103(a) as being unpatentable over Kim et al. ('061), Chao et al. and Dahlberg on claims 2-3 and 19-20 are withdrawn, because Applicant has amended or canceled the claims.

6. The claim rejections under 35 U.S.C. 103(a) as being unpatentable over Kim et al. ('061), Chao et al. and Habberman et al. on claims 11 and 14-16 are withdrawn, because Applicant has amended independent claim 1.

7. The claim rejections under 35 U.S.C. 103(a) as being unpatentable over Kim et al. ('061), Chao et al. and Richter et al. on claim 12 is withdrawn, because Applicant has amended or canceled the claims.

8. The claim rejections under 35 U.S.C. 103(a) as being unpatentable over Kim et al. ('061), Chao et al. and Hertl et al. on claim 13 is withdrawn, because Applicant has amended or canceled the claims.

9. The claim rejections under 35 U.S.C. 103(a) as being unpatentable over Kim et al. ('061), Chao et al. and Yamamoto on claim 18 is maintained.

As to Claim 18, KIM et al. ('061) discloses the method for the conversion of waste water (organic waste) wherein the waste water is introduced as a fuel into a biofuel cell consisting of a pair of electrodes (anode and cathode) and having an oxidizer introduced into the cathodic compartment and producing electricity and CO_2 off gas (Claim 4). KIM et al. ('061) discloses a cation exchange membrane used to separate the anode from the cathode thereby forming an anaerobic compartment (anode side) and an aerobic compartment (cathode side). However, KIM et al. does not expressly disclose a porous, electronically non-conductive, non ion-selective partition wall used to separate the anode and cathode.

However, CHAO et al. teaches that separators may be used in electrochemical cells (i.e. fuel cells) to separate the anode from the cathode (col. 5, line 67 to col. 6, line 1). CHAO et al. further teaches that the separator is preferably permeable to the electroactive species and preferably completely chemically and physically stable in the cell environment (col. 6, lines 7-10). Suitable separators include sintered glass, inorganic ion-exchange membranes (cation exchange membrane of KIM et al. ('061)) and woven and non-woven fabrics made from fiberglass (col. 6, lines 10-14).

At the time of the invention, a person having ordinary skill in the art would have found it obvious to substitute a non-woven fiberglass separator for the cation exchange membrane of KIM et al. ('061) because the two are known substitutes which provide for good separation of the anode and cathode in a fuel cell so as to reduce the rate of flow of electroactive species and electrochemical products, thus minimizing the reconversion of electrochemical products, as taught by CHAO et al. (col. 5, line 67 to col. 6, line 4). It would have been obvious that the substitution of one known element for another would have yielded predictable results to one of ordinary skill in the art at the time of the invention. CHAO et al. recognizes that ion-exchange materials are equivalent to woven and non-woven fabrics such as fiberglass that can be used as a separator in an electrochemical cell between and anode and a cathode.

The combination of KIM et al. ('061) and CHAO et al. does not expressly disclose the limitation of a means for discharging or storing electricity and provided with supply means for an oxidizer, preferably in the form of an air pump.

However, YAMAMOTO teaches a hybrid fuel cell system which comprises a storage battery (Abstract). An auxiliary controller for the fuel cell and an output current controller for

controlling the output current drawn form the fuel cell is provided so that the storage battery can be charged for recovery within the shortest possible time (Abstract). YAMAMOTO also teaches a supply air blower **9** for providing air to the fuel cell **3** (col. 3, line 55-col. 4, line 5 and Figure 1). At the time of the invention, a person having ordinary skill in the art would have found it obvious to modify the biofuel cell device of KIM et al. ('061) and CHAO et al. with an air blower so as to effectively provide the fuel cell with air, as taught by YAMAMOTO et al. (col. 3, line 55-col. 4, line 5 and Figure 1). Also, a person having ordinary skill in the art would have been motivated to incorporate a storage battery so that the biofuel cell system can be useful as a power supply in applications subject to sudden load fluctuations in power demand, as suggested by YAMAMOTO (Abstract).

10. The claim rejections under 35 U.S.C. 103(a) as being unpatentable over Kim et al. ('061), Chao et al. and Ying et al. on claim 22 is maintained.

As to Claim 22, KIM et al. ('061) discloses the method for the conversion of waste water (organic waste) wherein the waste water is introduced as a fuel into a biofuel cell consisting of a pair of electrodes (anode and cathode) and having an oxidizer introduced into the cathodic compartment and producing electricity and CO_2 off gas (Claim 4). KIM et al. ('061) discloses a cation exchange membrane used to separate the anode from the cathode thereby forming an anaerobic compartment (anode side) and an aerobic compartment (cathode side). However, KIM et al. does not expressly disclose a porous, electronically non-conductive, non ion-selective partition wall used to separate the anode and cathode.

However, CHAO et al. teaches that separators may be used in electrochemical cells (i.e. fuel cells) to separate the anode from the cathode (col. 5, line 67 to col. 6, line 1). CHAO et al. further teaches that the separator is preferably permeable to the electroactive species and preferably completely chemically and physically stable in the cell environment (col. 6, lines 7-10). Suitable separators include sintered glass, inorganic ion-exchange membranes (cation exchange membrane of KIM et al. ('061)) and woven and non-woven fabrics made from fiberglass (col. 6, lines 10-14).

At the time of the invention, a person having ordinary skill in the art would have found it obvious to substitute a non-woven fiberglass separator for the cation exchange membrane of KIM et al. ('061) because the two are known substitutes which provide for good separation of the anode and cathode in a fuel cell so as to reduce the rate of flow of electroactive species and electrochemical products, thus minimizing the reconversion of electrochemical products, as taught by CHAO et al. (col. 5, line 67 to col. 6, line 4). It would have been obvious that the substitution of one known element for another would have yielded predictable results to one of ordinary skill in the art at the time of the invention. CHAO et al. recognizes that ion-exchange materials are equivalent to woven and non-woven fabrics such as fiberglass that can be used as a separator in an electrochemical cell between and anode and a cathode.

KIM in view of CHAO et al. does not expressly disclose the limitation of a kit for processing organic waste wherein the partition wall is of polyurethane foam.

However, YING et al. teaches a separator for a fuel cell which employs a protective coating layer comprising suitable polymers such as polyurethanes (col. 13, lines 52-59).

At the time of the invention, a person having ordinary skill in the art would have found it obvious to modify the separator of the biofuel cell of KIM et al. ('061) and CHAO et al. with a polyurethane protective coating so as to obtain an increase in toughness and flexibility without having a negative impact on the desired separator properties, as taught by YING et al. (col. 13, lines 60-65).

Claim Rejections - 35 USC § 103

11. Claims 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over KIM et al. (WO 01/04061 A1) in view of CHAO et al. (US Patent No. 4,581,105) and HABERMANN et al. (Applied Microbiology and Biotechnology: Biological Fuel Cells with Sulphide Storage Capacity).

As to Claims 19-21, KIM et al. ('061) discloses the method for the conversion of waste water (organic waste) wherein the waste water is introduced as a fuel into a biofuel cell consisting of a pair of electrodes (anode and cathode) and having an oxidizer introduced into the cathodic compartment and producing electricity and CO_2 off gas (Claim 4). KIM et al. ('061) discloses a cation exchange membrane used to separate the anode from the cathode thereby forming an anaerobic compartment (anode side) and an aerobic compartment (cathode side). However, KIM et al. does not expressly disclose a porous, electronically non-conductive, non ion-selective partition wall used to separate the anode and cathode.

However, CHAO et al. teaches that separators may be used in electrochemical cells (i.e. fuel cells) to separate the anode from the cathode (col. 5, line 67 to col. 6, line 1). CHAO et al. further teaches that the separator is preferably permeable to the electroactive species and

preferably completely chemically and physically stable in the cell environment (col. 6, lines 7-10). Suitable separators include sintered glass, inorganic ion-exchange membranes (cation exchange membrane of KIM et al. ('061)) and woven and non-woven fabrics made from fiberglass (col. 6, lines 10-14).

At the time of the invention, a person having ordinary skill in the art would have found it obvious to substitute a non-woven fiberglass separator for the cation exchange membrane of KIM et al. ('061) because the two are known substitutes which provide for good separation of the anode and cathode in a fuel cell so as to reduce the rate of flow of electroactive species and electrochemical products, thus minimizing the reconversion of electrochemical products, as taught by CHAO et al. (col. 5, line 67 to col. 6, line 4). It would have been obvious that the substitution of one known element for another would have yielded predictable results to one of ordinary skill in the art at the time of the invention. CHAO et al. recognizes that ion-exchange materials are equivalent to woven and non-woven fabrics such as fiberglass that can be used as a separator in an electrochemical cell between and anode and a cathode. The combination of Kim et al. and Chao et al. does not specifically disclose wherein Fe ions are introduced in the space around the cathode.

However, HABERMANN et al. discloses a method according to claim 1, wherein a series of inorganic ions were used as cations, for example trace elements such as iron (pg. 129, col. 2). At the time of the invention, a person having ordinary skill in the art would have found it obvious to modify the fuel of KIM ('061) as modified by CHAO et al. with trace elements of iron as cations because Habermann et al. teaches that the demands for energy and nutrients can be met (pg. 129, col. 2).

Response to Arguments

12. Applicant's arguments, see Remarks, filed November 04, 2009, with respect to the rejection(s) of claim(s) 1-17 under 35 U.S.C. 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn.

Allowable Subject Matter

13. Claims 1, 3-7 and 9-17 are allowed.

The invention of independent claim 1 is directed to a method for the conversion of organic waste, wherein the waste is introduced into a cell in which a pair of electrodes is present, which pair of electrodes comprises at least one anode and at least one cathode, the anode and cathode being separated by a porous, electronically non-conductive, non-ion selective partition wall, while an oxidizer is introduced to the cathode and wherein a potential difference is formed across said pair of electrodes such that at the anode CO_2 is formed and that electricity is produced, and the porous electronically non-conductive, non-ion selective partition wall is partitioned to form at least one anaerobic compartment and at least one aerobic compartment, wherein the cell is a bipolar fuel cell having two or more pair of electrodes wherein each pair of electrodes is interconnected by an electronically conductive and non-ionic conductive wall, while the partition wall provides at least two types of channels, the open space of the first type of channel is in electrically conductive contact with the cathode and the open space of the second type of channel is in electronically conductive contact with the anode.

The closest prior arts of record, Kim et al. ('229), Kim et al. ('061), Chao et al. and Habermann et al. do not teach or suggest wherein biofuel cell is a bipolar fuel cell in which two

or more pair of electrodes are present, each pair of electrodes having one anode and one cathode, wherein the anode and cathode of each pair of electrodes are interconnected by an electronically conductive and non-ionic conductive wall, while the porous, electronically non-conductive, non-ion-selective partition wall of a at least two types of compartments provides at least two types of channels, the open space of the first type of channel being in electrically conductive contact with the cathode and the open space of the second type of channel being in electronically conductive contact with the anode.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ADAM A. ARCIERO whose telephone number is (571)270-5116. The examiner can normally be reached on Monday to Friday 8am to 5pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on 571-272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AA

/Dah-Wei D. Yuan/
Supervisory Patent Examiner, Art Unit 1795